

TRANS MAGNETICS INC

LEnox 9-2750

134-21 NORTHERN BLVD. FLUSHING, NEW YORK 11354

MODULATORS ■ DEMODULATORS ■ MULTIPLIERS ■ DIVIDERS
DIGITAL TO SYNCHRO CONVERTERS ■ SQUARERS ■ SQUARE-
ROOTERS ■ SOLID STATE SYNCHRO TRANSMITTER / RESOLVERS

MULTIPLIER / DIVIDER

General Description:

Series 350 and 370, available in size from 0.58 inch high flatpack, are 4 quadrant multipliers for use in multiplication, division, squaring, square rooting, generation of trigonometric functions, variable gain amplifier and similar non-linear computing.

Operation is completely compatible with operational amplifier circuitry. 350 Series are high performance. 370 Series is an economy line.

Applications are in analog computers, military control systems and industrial and process control.

RATINGS (For Multiplication Only)

Over operating temperature unless otherwise specified

TRANSFER FUNCTION $V_o = KX_1 X_2$

DC INPUT (X_1 X_2)

INPUT IMPEDANCE X_1 & X_2

DC OUTPUT

Linear Range X_1 & X_2

LINEARITY

NULL OUTPUT with either input zero at 25 C

With both inputs zero at 25 C

OUTPUT IMPEDANCE

OUTPUT CURRENT for linear operation

<u>UNIT</u>	<u>350 & 370 SERIES</u>
K	$.1 \pm 2\%$
Volts Max.	± 10
ohms min	100 K
Volts	± 10
% FS typ. max.	0.1 0.5
typ. max. typ.	± 15 mv ± 50 mv ± 10 mv
ohms max	500
ma max	1

TRANS MAGNETICS INC

TWX 212-539-2653

LEnox 9-2750

134-21 NORTHERN BLVD. FLUSHING, NEW YORK 11354

**MODULATORS ■ DEMODULATORS ■ MULTIPLIERS ■ DIVIDER
DIGITAL TO SYNCHRO CONVERTERS ■ SQUARERS ■ SQUARE-
ROOTERS ■ SOLID STATE SYNCHRO TRANSMITTER / RESOLVERS**

	<u>UNIT</u>	350 & 370 <u>SERIES</u>
<u>OUTPUT SHORT</u> circuit duration at 25 C	sec max	3
<u>3DB RESPONSE</u> EITHER INPUT, 2nd input DC	Hz typ.	100
<u>RIPPLE</u> DC to 800 Hz	mv rms max total typ. total max.	5 20 30
<u>SUPPLY VOLTAGE</u> 3 wire DC	nom.	+ 15V
<u>SUPPLY CURRENT</u>	ma max.	30
<u>LIMITS</u> - absolute max voltage input any terminal	volts	± 18
<u>SENSITIVITY</u> to supply voltage	mv/% typ. max.	2 10

PLEASE NOTE THE FOLLOWING DIFFERENCES BETWEEN MODELS

	<u>UNIT</u>	350 <u>SERIES</u>	370 <u>SERIES</u>
<u>GAIN STABILITY</u> over operating temp.	% max	1/2	3
<u>NULL STABILITY</u> over operating temp.	mv typ. max.	15 50	25 100

Series 350 Multiplier-Dividers are available in several sizes and operating temperature ranges.

<u>TEMPERATURE:</u>	SUFFIX - M	-55 to + 85 C
	C	0 to + 70 C
	R	-25 to + 85 C

- Quality Control To MIL-Q-9858.

Designs Meet MIL-E-5400, MIL-T-21200, MIL-E-5272 And
Equivalent Specifications.

TRANS MAGNETICS INC

TWX 212-539-2653

LEnox 9-2750

134-21 NORTHERN BLVD. FLUSHING, NEW YORK 11354

MODULATORS ■ DEMODULATORS ■ MULTIPLIERS ■ DIVIDERS
DIGITAL TO SYNCHRO CONVERTERS ■ SQUARERS ■ SQUARE-
ROOTERS ■ SOLID STATE SYNCHRO TRANSMITTER / RESOLVERS

CASE STYLE: SUFFIX - P4 .580 high x 2 x 2 1/4

P2 2 1/2 x 3 3/16 x .750 inch high

NOTE:

C & R Temperature devices will operate from -55 to + 85 C at reduced accuracy

MODELS AVAILABLE

350MP4

350CP4

350RP2 - Available from stock. Price \$189.00 in 1-9 quantity.

370MP4

OTHER MODELS

Wide Band Multipliers (For AC x AC [or DC] multiplication)

Modulating Multipliers (AC x DC = AC)

Analog Dividers

Analog Squarers

Analog Square Rooters

NEW - SOLID STATE SYNCHRO SYSTEMS

INCLUDING: Solid State Synchro Transmitters
Solid State Sin-Cos Potentiometers
Digital to Synchro Converters
Angle (DC) to Synchro Converters

WRITE FOR MORE INFORMATION

All specifications are subject to change without notice and should be confirmed when ordering.

- Our Products Are Engineered To Your Design Requirements At Production Prices.
- Leading The State Of The Art In Miniaturization And Circuitry.
- Engineering Representatives At Your Door. See List In Latest Issues Of EFM, EBG.

THIS DRAWING IS FURNISHED AS CONFIDENTIAL INFORMATION ONLY. ANY REPRODUCTION THEREOF OR USE OF SUCH DESIGN OR FEATURES WITHOUT OUR WRITTEN PERMISSION IS A VIOLATION OF OUR EXCLUSIVE RIGHTS.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

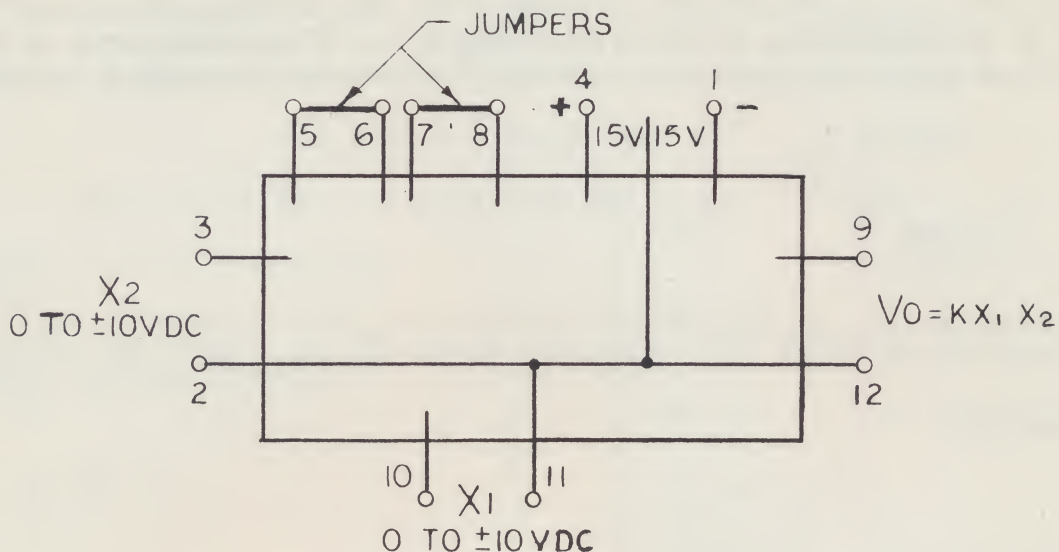


FIGURE 1 MULTIPLIER CONNECTIONS

FOR DIVIDER OPERATION REMOVE JUMPERS BETWEEN 5&6, 7&8 AND CONNECT AS FOLLOWS:

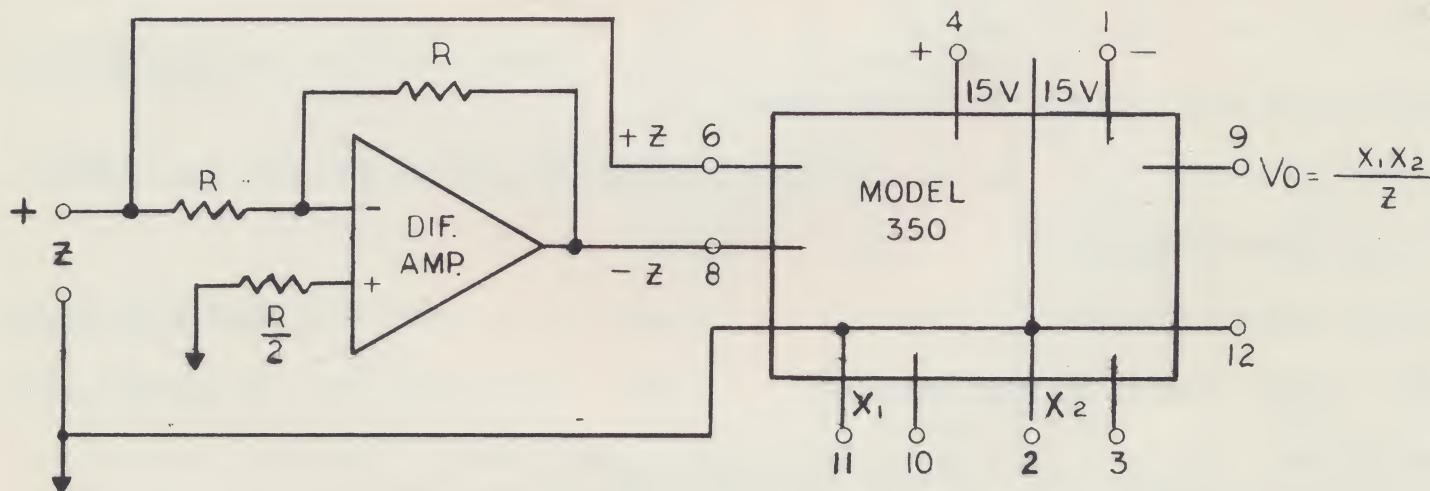


FIGURE 2 DIVIDER CONNECTIONS

NOTES

1. OUTPUT SATURATES FOR $X_1 > Z$.
2. Z MUST BE A PLUS VOLTAGE.

DIMENSIONAL TOLERANCES UNLESS OTHERWISE SPECIFIED			DRAWN K.Campbell	DATE 4-1-66	TITLE 350 - 370 CONNECTION DIAGRAMS	TRANS  MAGNETICS	
2 PL. DEC.	3 PL. DEC.	ANG.				134-08 36TH ROAD / FLUSHING 54 NEW YORK	370A001
± 	± 	± 	CHECKED	DATE	SCALE  CODE: 17755	SIZE A	
			APPROVED ms	DATE			SHEET 3 OF 3



ANALOG MULTIPLIER DC TO WIDE BAND

MODEL

380

DESCRIPTION:

Model 380 provides true analog multiplication in all four quadrants. Using newly developed techniques derived from quarter square principles; miniaturization, accuracy, versatility, and economy, have all been combined in a series of convenient packages arranged for printed circuit mounting. No external circuitry is required to perform the mathematical equation $K (X \times Y) = V_o$.

FEATURES:

Linearity: 0.5% Full Scale

Wide Band Input: DC to 30K Hz

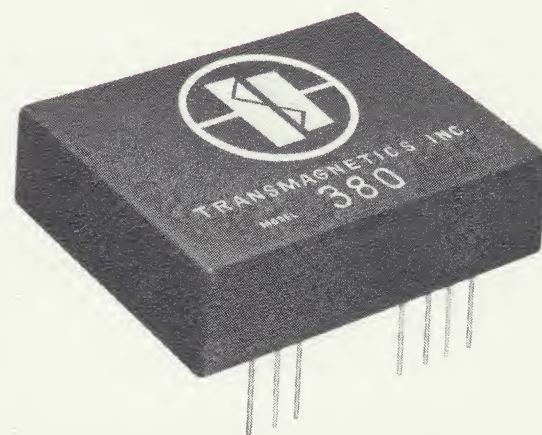
Phase Shift (at 400 Hz): 0.5° max.

Four Quadrant Operation

Full Military Environment

Completely Solid State

Designed to meet MIL E-5400



**OTHER
ANALOG
COMPUTING
MODULES:**

$\sqrt{X^2 + Y^2}$ (HYPOTENUSE SOLVER)

$\sqrt{X^2 - Y^2}$

DIVIDERS

MULTIPLIER/DIVIDERS

SQUARERS

SQUARE ROOTERS

SIN-COS FUNCTION GENERATORS

COMPUTING MODULATORS

SOLID STATE SYNCHROS

SOLID STATE RESOLVERS

PHASE SENSITIVE DEMODULATORS

APPLICATIONS.

PRECISION SERVO
MODULATOR

DC TO AC CONVERSION

VARIABLE GAIN CONTROL

POWER MEASUREMENT

TRIGONOMETRIC
COMPUTATION

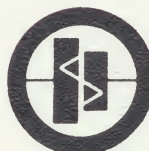
SIGNAL SAMPLING

POLAR TO RECTANGULAR
TRANSFORMATION

CORRELATION FUNCTION

FUNCTIONAL COMPUTER

- Application Engineering At No Charge
- See Our Ad in EEM
- Write or Call For Information

**TRANSMAGNETICS INC.**

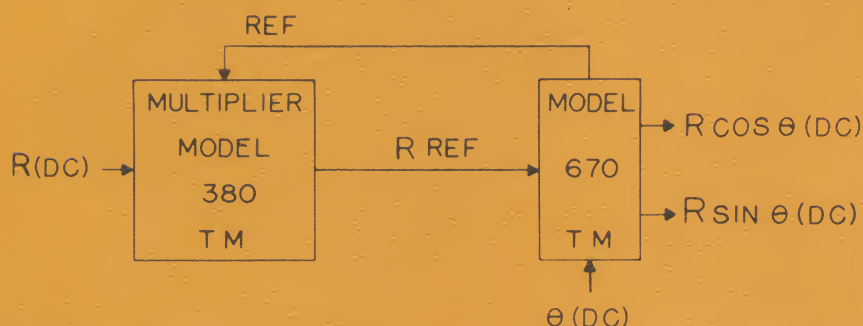
134-25 NORTHERN BLVD. / FLUSHING, N. Y. 11354
212-539-2750 • TWX: 710-582-2472

ANALOG MULTIPLIER DC TO WIDE BAND

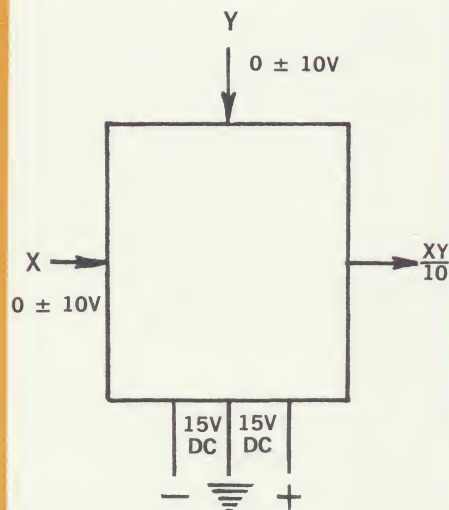
MODEL
380

POLAR TO RECTANGULAR TRANSFORMATION

SOLID STATE



TYPICAL APPLICATION



SPECIFICATIONS:

Input: 0 to $\pm 10V$
Input Impedance: 10K ohms resistive minimum
Maximum Voltage input any terminal: 18V
Output: $\pm 10V$ into 10K ohms minimum
Output Impedance: 50 ohms
Transfer Function: $V_o = \frac{XY}{10}$ nominal
Scale Factor: within $\pm 2\%$ unit to unit
Linearity: 0.5% full scale
Phase Shift: less than 0.5° @ 400Hz
Null: 30MV max, either input zero
Temperature Stability: (± 200 ppm $\pm 0.5MV$) / $^\circ C$

3 DB Band Width: 30K Hz measured with one input DC
Power Required: 3 wire + and -15V DC @ 35MA max.
Power Sensitivity: 100MV / % change of either +15 or -15V line
Operating Temperature: choose suffix C or M
Storage Temperature: $-65^\circ C$ to $+125^\circ C$
Vibration: MIL E-5400 — Curves 1 and 2
Shock: MIL E-5400 — 15g per Para 3.2.21.6
Humidity: MIL-E-5400 — Para 3.2.21.4
Altitude: MIL E-5400 — Table II
Size: Choose suffix P4 or P6

AVAILABLE TEMPERATURE RANGES:

Suffix C: $0^\circ C$ to $70^\circ C$
 Suffix M: $-55^\circ C$ to $+85^\circ C$

AVAILABLE MODELS:
 380CP6, 380CP4, 380MP4

AVAILABLE SIZES:
 Suffix P4: .580" H max x 2" x 2.25"
 Suffix P6: 1.531" H max x 3.18" x 3.43"

ECONOMY SPECIAL: Model 390MP4: same as model 380MP4 except temperature stability is ± 300 ppm ± 1.0 MV/ $^\circ C$

All specifications are subject to change without notice and should be confirmed when ordering.



TRANSMAGNETICS INC.

134-25 NORTHERN BLVD. / FLUSHING, N. Y. 11354 / 212-539-2750